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## Standard Setting and Market Power

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### **Patents, Standards, and Value**

Most patents do not create market power, despite the implications of terms such as *patent monopoly*. This is because most patents protect technologies that, while novel and useful, have close substitutes. However technically original an invention may be, its value is no greater than the price people are willing to pay for the advantage the invention confers over the next-best alternative. An invention that is merely different from, but not an improvement over, existing alternatives will not be worth much, no matter how new and exciting the inventors claim their technology is.

In certain industries and in a very specific set of technical and economic circumstances, the combination of standard setting and patents can create market power where none might otherwise exist. It bears emphasizing, however, that just as one should not infer market power from the existence of a patent, neither should one assume that standard setting in the presence of patenting creates market power.

Standard setting has the potential to create market power (i.e., increase the value of a technology) when a technology with close substitutes wins a formal standard-setting competition and the fact of having been named a standard separates the standardized technology from its formerly equivalent substitutes. Standard setting creates market power by making otherwise close substitutes inferior, and thereby increasing the royalty rate (price) a technology can command. By contrast, when the invention would dominate the alternatives in a technology market on its

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own inherent merits, ratification of the market outcome by formal standard setting is an afterthought; it changes nothing.

One of the goals of a standard-setting organization (SSO) is to choose a technology as the standard that will yield the best performance at the lowest possible cost. The technology that offers the best technical performance is not necessarily the first choice if the cost of that technology exceeds its performance advantage. A predicament facing the SSO in trying to choose the technology with the best price-performance trade-off is that the price of the chosen technology can change after the standard is determined if the technology owner attempts to extract the value added by the standardization process in royalty fees for the standard technology. If the SSO were not aware that the technology it was including in the standard was proprietary, it would not be aware of the likely *ex post* cost of the standard.

To ensure that it has the most information possible about the potential for the technologies it is considering being subject to royalties, many SSOs request that their members disclose any relevant patents that they have to the SSO during the standard-setting process. In addition, the SSO also typically requires that a member whose proprietary technology is included in the standard will license that technology to other members of the SSO either free of charge or on "fair, reasonable, or non-discriminatory terms."

### The Impact of Disclosure Rules

SSOs rely upon disclosure rules to accomplish important objectives. Disclosure rules enable the SSO to obtain information about whether technologies under consideration for inclusion in the standard are proprietary and subject to licensing. They thereby reduce the potential for a technology to be included in a standard without the knowledge that there may be a technology owner with intellectual property that reads on the standard who may try to extract opportunistic royalties for the use of the technology.

In the absence of knowledge about proprietary intellectual property rights in the technologies under consideration, manufacturers may find themselves the victims of opportunism after the standard has been set. That is, the patent owner may charge a royalty that reflects a premium arising from the cost of revising the standard to save the cost of royalty. A patent owner may charge such a premium when the patent emerges after manufacturers have made sunk investment in the patented feature of the

standard without having predetermined the license fee.<sup>1</sup> Avoiding the technology (and the required license) entails undertaking additional investment costs if the old (potentially infringing) investments cannot be modified to evade the patent. The manufacturers are in a weak negotiating position compared to the patent owner because the patent owner can credibly seek high licensing fees backed up with the threat of lawsuit if the manufacturers' product infringes upon the patent. The manufacturers could redesign their product around the patent, but this could require a major redesign effort and cause a significant disruption to production. The manufacturers could still be potentially liable for any products sold after the patent issued and before the redesigned products were available. Furthermore, the new product could be incompatible with other products or different versions of the product, which would further increase redesigning costs for manufacturers.

In order for a technology owner to profit from opportunism of this sort and for such opportunism to be a concern to the SSO, three important conditions must be met. First, the proprietary technology must be essential to the standard or else it could simply be omitted. An attempt by the patent owner to charge opportunistic royalties would result in manufacturers leaving that particular technology out of the final product. Second, there must be costs associated with changing either the standard or the manufacturing process that are greater than the royalty demanded. Finally, there must be alternatives to the chosen patented technology that could plausibly have been adopted had disclosure taken place. If there were no economic alternative, the patent owner would have been able to extract the full value of preventing manufacturers from making on-standard products by means of the exclusionary power of the patent alone. Thus, if there were no economic alternatives, the SSO could not benefit from the proprietary nature of the technology at issue having been disclosed.

Because of the potential for opportunism in standard setting, SSOs employ a variety of disclosure rules and enforce them with varying degrees of strictness. An example of one such rule is that issued patents essential to the standard be disclosed by standard-setting participants

<sup>1</sup> Sunk investments are those that cannot be recovered if the manufacturer decides to adopt a different production process or manufacture his products according to an out-of-standard technology.

who are active proponents of the adoption of their technology.<sup>2</sup> A more rigorous rule is a requirement that all participants disclose issued patents, essential or otherwise, and whether or not the technology owner is an active proponent of its own technology. More rigorous still is a rule requiring disclosure of both issued patents and patent applications.

Disclosure rules vary because along with the potential benefits of disclosure, described above, there are costs of compliance. Compliance costs fall into two categories: transaction costs and the risk of diminishing the property right. These costs are borne directly by the organization members and indirectly by the SSO if compliance costs cause some technology owners to opt out of the SSO, making the SSO less effective. The more rigorous the disclosure rule, the higher the cost of complying. It is costly for the SSO representative of a member firm to first learn the patent portfolio of his firm, particularly if that firm is a large, research-based organization, and then to ascertain whether any patents read on the standard. The need to do this for as-yet-unpatented projects increases the cost.<sup>3</sup>

Rules that require the disclosure of unprotected intellectual property such as patent applications pose obvious risks for the IP owners. U.S. patent applications are kept secret for 18 months so that premature disclosure does not lead to unprotected use of the invention. Disclosure of unpublished or even published applications in standard-setting bodies opens the applicant up to the risk of interferences in the patent application procedure. These interferences will be costly to the applicant and may be brought by a competitor whose goals are to increase its rivals' costs or steer the standard-setting committee toward a less desirable technology.

In addition, a disclosure requirement covering patent applications reduces the value of a patent later obtained because it affords others—typically, competitors in the technology market—a head start toward evasion or design-around efforts that will diminish the value of the patented

<sup>2</sup> Since patents are public documents, a rule requiring disclosure of patents merely saves the SSO patent-searching costs. If the disclosure rule is accompanied by a requirement that a standard-setting participant's patents be licensed on "reasonable and non-discriminatory" (RAND) terms, as is often the case, the SSO's objective is to nullify, not merely discover, the potential for opportunistic licensing.

<sup>3</sup> Without a requirement that a firm's representative be knowledgeable about the firm's actual and potential intellectual property, any disclosure rule can be evaded by sending a deliberately ignorant representative. Because full compliance by an ignorant representative does not yield any of the benefits of disclosure to the SSO, we assume that member firms feel some obligation to send a knowledgeable representative.

technology. Application owners will weigh the benefits of joining a standard-setting organization against the cost of revealing potentially valuable intellectual property before it is protected by a patent.

The costs of disclosure fall not only upon members but upon the standard-setting organizations themselves: As cost and risk rise for individual member firms, the attractiveness of opting out of participation in standard setting increases. This is dangerous for the SSO and for economic efficiency in industries for which formal standard setting is an efficiency-enhancing activity.

In addition, mandating disclosure of patent applications has the potential for facilitating coordination among various factions of standard-setting members to the detriment of other members. Buyers of technology have an incentive to depress prices while sellers of technology have an incentive to raise prices. Technology buyers may work against technology sellers by attempting to design around prematurely disclosed patentable claims to depress royalties and to deter the entry of technological mavericks. This would create a disincentive for nonmanufacturing firms (i.e., firms specializing in R&D) to participate in standard-setting organizations. Alternatively, some members of the SSO may try to get the standard to move in a particular direction to create a weaker competitor to its own proprietary technology. That is, a committee member with a proprietary competing technology may object to any features of the standard that may become patentable by other members of the committee if those features add performance benefits to the standard, thus making it a more formidable competitor to the member's own out-of-standard proprietary technology.

It is unlikely that there is a single "one size fits all" optimal disclosure rule for standard-setting bodies. There is bound to be variation by industry or technology in the value sacrificed by an inventor as a result of premature disclosure, just as there are inter-industry differences in the value that patent protection affords.<sup>4</sup> To the extent that the benefits and costs described above cannot be measured in a given industry, the optimal rule for that industry may be, in fact, unknowable.

Because of differences across industries in the reward afforded by patent protection and in the incentives of standard-setting members, no rule would be optimal for all situations. Because of this heterogeneity across industries, the policy choice that leaves the disclosure rule and the

<sup>4</sup> See, for example, Mark Schankerman, "How Valuable Is Patent Protection? Estimates by Technology Field," *RAND Journal of Economics*, 29, no. 1 (Spring 1998): 94.

rigor of enforcement up to standard-setting organizations themselves may be best. Standard-setting bodies may be the best suited (1) to understand their industry, (2) to determine how susceptible they are to capture or holdup by one of their members,<sup>5</sup> and (3), absent capture, to optimize the trade-off between the benefits and costs of disclosure that these rules entail. This conclusion does not rule out antitrust enforcement against firms which abuse standard setting to monopolize technology markets. It does, however, imply an approach to antitrust enforcement that is tailored to the specific characteristics of the industry and the technology.

### **Reasonable and Non-Discriminatory Royalty Rates in Standard Setting**

Having learned through disclosure what elements of the standardized technology may be proprietary and subject to royalties, the standard-setting body is still left with the problem of trying to forecast what royalty or licensing fees the technology owner is likely to charge after the standard is determined. The typical SSO patent policy mandating that a royalty be "fair, reasonable, and non-discriminatory" gives little guidance for royalty determination because "reasonable" can mean different things to a technology owner and a technology buyer.

The economist's approach is to consider as reasonable a royalty that reflects the inherent benefits of the technology over the next-best alternative. A reasonable royalty for a standardized technology should not be less than the expected royalty the technology owner would have been able to command had the standard-setting body never been formed and technology owners competed in the market to become a *de facto* standard. This gives a target for a reasonable royalty for a *de jure* (formal) standard: The technology owner should be able to earn at least the expected royalty he could have earned in an open and competitive market.

A useful way of thinking about the reasonableness issue is to imagine the outcome of a royalty negotiation as a sharing of the gains from achieving a bargain between a patent owner and potential licensees. Whether any particular split of the value created by the standard is "fair" is not up to an economist to decide. Economics, though, can provide useful insights into the incentive properties of any solution and rule out

solutions that yield incentives that are undesirable from the point of view of economic efficiency.

It is desirable to encourage firms to design technology with an eye on achieving compatibility in industries where technology users benefit from compatibility. It is also desirable to encourage technology-intensive firms to offer their technologies to standard-setting bodies for consideration in industries where standards matter, or when the technology of one firm represents such a significant improvement over alternative modes that it is socially desirable to have that technology become the standard. If the firm with the superior technology were not assured of receiving appropriate compensation for its invention, it might opt not to participate in the standard-setting process. If inventors of great advances opt out of standard-setting bodies, we are left with the potential of either the chosen standard being an inferior alternative or the chosen standard being irrelevant and the act of determining the standard an inefficient use of resources. The implication is that, built into the definition of reasonableness, there ought to be an incentive for bringing technology to a standard-setting body. Put another way, the reasonable and non-discriminatory standard should not be set so as to deprive patent owners of the incentive to propose their technology as a standard.

Note, however, that incentives are already in place to design for standardization. Since market forces can determine the winner in a standards war, and becoming the standard can create market power, firms wishing to see their technology become the standard will invent with the objective of winning in the market. They will have incentives to submit their inventions for consideration to formal standard-setting agencies in hope of saving the cost of a standards war, but only as long as doing so does not deprive them of the fruits of winning. If all gains were taken away, firms would rather go to war in the market than submit to the profit-destroying restrictions of a standard-setting body.

The gains from formal standard setting can be defined as the difference between the royalty that the technology owner can charge after being selected formally as the standard and the royalty that the technology owner could charge if no formal standard were set.<sup>6</sup> To award the patent owner all the gains from formal standardization creates a strong incentive

<sup>5</sup> Capture and holdup refer to the ability of a patent owner to exclude manufacturers from manufacturing according to the defined standard unless those manufacturers agree to the patent owner's royalty demands.

<sup>6</sup> And, by implication, the ability to charge was set by the cost of employing the next-best alternative. A technology with a close substitute will gain value from formal standard setting as the substitute will be ruled out-of-standard. A technology with no close substitute will gain little or no value from formal standard setting because it would have been the *de facto* standard.

for firms to invent with the goal of becoming a formal standard and for bringing inventions, especially those which are not major advances, into the formal standard-setting process. However, because all of the gains of standardization will be absorbed by the patent owner, users of the standardized technology will be no better off than if a standard had not been chosen (the value to them of having a standard will equal the cost of purchasing the standardized technology).

Alternatively, if the patent owner were not awarded any of the gains of standard setting, it may choose to try to win a standards war in the market, which would allow it to capture all of the gains from becoming a *de facto* standard. The patent owner will weigh the probability of winning a standards war in the market and earning higher royalties against the probability of being chosen as a *de jure* standard and earning royalties reflecting only the prestandardized value of his technology. The expected value of a technology reflects the probability of winning the standards war, the costs of waging the war, and the price the technology could command if it became a *de facto* standard. The probability of winning a standards war depends on the extent of the price-performance advantage of the patented technology at issue. Technology owners whose patents represent significant advances in improving performance or manufacturing efficiency will have a greater incentive to let the market choose the standard than technology owners whose patents represent minimal advances.

Dividing the gains from standardization between the patent owner and the standard users can ensure that innovators have an incentive to join SSOs and that technology users maintain some benefit from having a standard. Note though, that the minimum royalty that will induce an innovator of a significant technological advance to join a standard-setting organization will be different than the minimum royalty that will induce the owner of a technology with many economically equivalent alternatives to join. The inventor of a significant technological achievement will likely require a greater share of the benefits of standardization to be willing to forego the chance of becoming a *de facto* standard and having freer rein to set his royalty.

As to the “free of unfair discrimination” condition that standard-setting bodies strive to impose, one possible interpretation relates to the economist’s definition of price discrimination. Price discrimination refers to the act of charging two or more customers—licensees in this case—different prices where the differences are not explained by differences in the economic costs of dealing with them. Economic costs include not

only direct costs but also, for example, opportunity costs and the risks imposed on the licensor by the licensee and other economic costs. If this interpretation is appropriate, its implication is that to agree to license on terms free of unfair discrimination entails an agreement to charge licensees the same royalty rate, except where the economic costs of licensing customers differ. In those instances, the prices (royalties) should differ with differences in licensing costs.

Limiting the ability of a licensor to charge different royalties to different licensees may reduce the use of technology.<sup>7</sup> Allowing a patent owner to charge different licensees different royalties induces more licensing than imposing a single-rate rule would. Indeed, this is economically efficient and can enhance social welfare because a licensor can establish low prices for price-sensitive licensees and higher prices for less price-sensitive licensees. The result is that output (i.e., licenses sold and, conceivably, goods or services sold with licensed technology) increases. If a patent owner were forced to set one royalty rate schedule for all licensees, then the chosen royalty rate may be too high for some manufacturers, and they would opt out of the technology market. Since these manufacturers would be willing to license the technology at a lower royalty rate and the patent owner would be willing to charge them a lower price if he could do so without sacrificing the higher royalty he gets from other licensees, the one-price rule can create what economists refer to as dead-weight loss—a loss in social welfare as a result of market imperfection. To avoid these social welfare losses, economic price discrimination can be beneficial.

However, a standard-setting body may legitimately be concerned that a participant in the standard-setting process may attempt to raise its rivals’ costs or otherwise discriminate against its rivals for the purposes of reducing competition. Thus, a rule against “unfair” discrimination that requires that the same royalty be offered to “similarly situated” licensees enables the technology owner to expand output to the benefit of welfare without the risk that it could use price discrimination to hinder its rivals in competition in the product market. It permits both pricing where the cost differences of licensing different parties fully explain price differences and price discrimination where it cannot harm competition.

<sup>7</sup> For example, a requirement for no price discrimination might rule out the use of lump-sum payments, either alone or in combination with running royalties. Lump-sum payments that are not calibrated to different levels of sales are likely to imply price discrimination because, with lump-sum payments, high-volume licensees will pay lower per-unit licensing fees than low-volume licensees.

## Conclusion

We tend to think about patents and standards as conveying market power because that is the interesting case. Reality is more varied, not only because few inventions are blockbusters, but also because patents matter more in certain industries than others. The same applies to standards. Realism requires looking beyond the convenient abstractions to the specific characteristics of individual technology markets.

Disclosure rules have benefits and costs whose balance will vary with the nature of technology markets, including the extent of their dependence on compatibility and standardization and the characteristics of innovative and imitative activity within them. In standard-setting policy determination, preserving the incentive to participate in standard-setting activities must be part of the solution. Because the link between economic efficiency and standard-setting participation is likely to vary by industry, so must the rules.

The reasonableness of a royalty may be assessed in terms of the division of the gains from licensing between licensor and licensees. While there is no single right answer that would apply to all situations, we may be able to rule out as unreasonable those royalties that leave the patent owner worse than he would have been had he not joined the SSO and those royalties that absorb all of the gains from standardization. The threshold for what is reasonable will depend on the nature of the invention that is chosen as the standard.

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## Essential Issues in the Competitive Analysis of Patent Pools

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In the U.S., the pooling of patents by multiple patent owners has been instrumental in many markets in clearing the way for new product development and innovation. Indeed, as noted in *Antitrust Guidelines for the Licensing of Intellectual Property*, issued by the United States Department of Justice (DOJ) and Federal Trade Commission (FTC), patent pools and cross-licensing arrangements

may provide procompetitive benefits by integrating complementary technologies, reducing transaction costs, clearing blocking positions, and avoiding costly infringement litigation. By promoting the dissemination of technology, cross-licensing and pooling arrangements are often procompetitive.<sup>1</sup>

These concepts are reiterated in the business review letters that have been issued on matters involving joint licensing arrangements and in testimony submitted to the DOJ and FTC Joint Hearings on Competition and Intellectual Property Law and Policy in the Knowledge-Based Economy.<sup>2</sup>

<sup>1</sup> See DOJ and FTC, *Antitrust Guidelines for the Licensing of Intellectual Property*, section 5.5, 6 April 1995 at <http://www.usdoj.gov/atr/public/guidelines/ipguide.htm>.

<sup>2</sup> See, for example, a business review letter to Garrard R. Beeney, Esq., from Joel I. Klein regarding the DVD-ROM and DVD-Video joint licensing arrangements, 16 December 1998; a business review letter to Carey R. Ramos, Esq., from Joel I. Klein regarding the DVD-ROM and DVD-Video joint licensing arrangements, 10 June 1999; and a business review letter to Ky P. Ewing, Esq., from Charles A. James regarding the 3G Patent Platform, 12 November 2002. The DOJ's analysis of these patent pools was conducted at the request of the parties as part of the DOJ's business review procedure. In addition, numerous individuals submitted testimony on the subject of patent pools at the DOJ and FTC hearings, and their presentations and papers can be found on the FTC's website, at [www.ftc.gov](http://www.ftc.gov).